it is expected to be of more use during the coming summer. A recording instrument is to be installed to keep a continuous record of the intensity of "static" and a direction-recording instrument also is being devised. With these used in connection with the daily weather map and local meteorological data it is hoped to forecast with considerable accuracy the approximate time, extent, and duration of thunderstorms occurring within 20 or 30 miles of the air station.

NAVAL METEOROLOGY DURING SEAPLANE FLIGHTS FROM SAN DIEGO TO BALBOA.

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[U. S. S. *Aroostook*, Pacific Fleet, April, 1921.]

The following few paragraphs contain a brief sketch of the conditions of the weather and forecasting results obtained by the United States Navy meteorologists during the trip to and from Balboa, Panama.

Aside from what data can be obtained from the hydrographic pilot charts there is to be found very little information of value in regard to weather conditions from San Diego, Calif., to Balboa, Canal Zone.

The daily forecasts issued by the aerological department aboard the flagship U. S. S. *Aroostook* during the long flight of the seaplanes from San Diego, Calif., to Balboa, while compiled from a limited amount of data, and entirely without the use of a weather map, showed a remarkable percentage of correct conditions encountered during the trip both to and from Balboa, Panama.

The most valuable means of forecasting were obtained by the use of the barometer, thermometer, and hydrograph, together with a continual study of the clouds and appearance of the sky. A nephoscope was used to advantage in the cloud study.

The two most treacherous places for which to forecast along the coast were the Gulfs of Fonseca and Tehauntepec. It is in the latter of these that unusually strong winds prevail for days at a time, almost without apparent cause, and a barometer gives no indication of the intensity of these wind streams. In lieu of the practically infallible weather maps it was found necessary to partly rely upon old Mexican Indian weather lore, covering the wind that is known locally as a "Tehauntepecker."

These winds, beginning about the middle of October, continue to prevail until April when they die out, and are then supplemented by the prevailing south-southwest wind for the following months of June, July, and August.

The "Tehauntepecker" is a northerly wind which may vary a few points to either east or west of true north. It blows with considerable violence and is noticeable several hundred miles out to sea. The highest velocity recorded was 48 miles an hour as shown by the anemometer. This causes a short, high sea, which makes the handling of seaplanes not only difficult but dangerous.

The use of pilot balloon soundings at sea were attempted during this trip, but owing to the continuous motion of the ship and the heavy smoke from its stacks it was impossible to obtain any satisfactory results in this way.

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WEATHER AT GENEVA DURING THE WINTER 1920-21.

[Reprinted from the *Journal de Genève*, Mar. 29, 1921.]

(Translated by Lewis W. Haskell, American consul, Geneva, Switzerland, Mar. 29, 1921.)

The most characteristic feature of the winter 1920–21 is unquestionably its *dryness.*

As to the temperature, the winter has been normal but rather warm. It was not as normal, nor so warm, however, as the preceding winter. Last year, the three winter months of December, January, and February had almost the same temperature. This year, they were all warm, but unequally so; and the month of January, which should be the coldest, was much warmer than the other months. It may even be said that it was, after January, 1834, the warmest month of January in our series. Every day of the month has been in excess of the average temperature and none was under 0° C.. The coldest day, January 7, with 0.01°, was still 0.33° above the average temperature. This is extremely rare, especially in winter. The month of January, 1834, had a mean temperature of 5.14°; the year 1834 was in fact a quite exceptional year, with 11.48°.

If we now consider the precipitation of the winter, we may see that the winter 1920-21, as well as the preceding one, has been almost without snow; 4 centimeters on December 16, 3 centimeters on January 17, and 4 centimeters on February 2; 11 centimeters in all.

The winter season has been dry, but less so than we think. It has even rained rather often, especially in December and in January; but never in large amounts; the greatest amounts were 13 millimeters on December 3; 18 millimeters on January 13, and 9 millimeters on February 2.

We must not forget that if the actual winter seems to us to be very dry, it is because we compare it with the immediately preceding winters. During the last 25 years the winters have been characterized by much greater precipitation than for the 70 years preceding these 25 years:

Period from 1826 to 1895, 138 millimeters per winter.

Period from 1896 to 1920, 186 millimeters per winter.

There has then been a mean augmentation of almost 50 millimeters, which is very great, and this fact explains our opinion that a winter season with only 87 millimeters is a very dry winter after the very wet winters which have so long prevailed.

But the most characteristic feature of this last winter is that the dryness began in the autumn—September, 1920, with 182 millimeters; but October, with 65 millimeters, and especially November, with 12 millimeters, were under normal. This explains the actual dryness, because from September to February, there should have fallen, according to the average quantity for 95 years, 327 millimeters of rain, and the quantity has been only 164 millimeters—that is to say, exactly half of the ordinary quantity.

There have been, in the past, periods of these same five months which were also dry. We give them here below, the last years being given first:

Winter.	Amount of rain (in millimeters).		Total.	Temperature of the winter.
	October, November, and December.	February and March.		
1920–21	77	87	164	Warm.
1908–9	61	89	150	Cold.
1904–5	51	88	139	Normal (cool).
1897–98	15	121	136	Rather warm.
1890–91	125	44	169	Very cold.
1879–80	108	87	195	Do.
1873–74	149	37	186	Normal.
1869–70	97	101	198	Rather cool.
1867–68	97	61	158	Normal.
1863–64	78	56	134	Cold.
1853–54	123	42	165	Do.

So one can see that there have been winters which were as dry as the last one. These dry winters were for the greatest part cold rather than warm; on the contrary, the last one was warm.

Level of the Lake Geneva.—This level is exceptionally low at the present time. We only find such low waters at the end of the winter of 1840, in March and in April. The level was at that time the same as it was on March 15 to 18 of this year.

Duration of the absolute dryness.—As we have seen, there had fallen 14 millimeters of rain on February 1 and 2, 1921. After that, we have had 41 days of absolute dryness, that is to say, until March 17, 1921. This is not the longest period of drought we have had; during the winter of 1896 we had a period of 41 days without rain.

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ANOTHER NOTE IN REGARD TO THE PRIMARY CAUSE OF COLDS.

A former note [1] on this subject by John R. Weeks declares, that the conclusions [2] arrived at by C. M. Richter at the end of his paper on "Colds and their relation to the physics of the atmosphere," do not seem to be in accord with the most recent medical thought. Conclusion No. 1 in question reads: "Acute coryza, commonly called a 'cold,' depends for its development primarily on an excess of moisture in the air we inhale." The most recent medical thought, as expressed for instance in a 1920 edition of a standard textbook [3] refers to the primary cause of acute rhinitis (common colds) as follows: "Its most conspicuous cause is exposure to drafts of air and to the influence of the atmospheric vicissitudes that are especially prevalent during the winter and spring seasons." As we know, winter and spring are likewise the seasons for cyclonic weather. The textbook adds: "Hence local disturbances of the circulation due to exposure are to be regarded as the accidental means of preparing the soil for bacterial invasion." One of the conclusions (No. 6) in question states this same fact. The question of a bacillus rhinitis (Tunnicliff) may be considered as remaining in the experimental stage, although recent investigations disprove the pathogenic quality of the Tunnicliff bacillus for acute rhinitis (Hall [4]) and also discredit a filtrable virus as the cause of either common colds or influenza (Branham and Hall [4]).

In Mr. Weeks's note it is stated, that the expired air being "normally near the saturation point"—that "therefore saturated air per se can not cause a discharge from the mucous membranes." This process is much more complicated than these words would indicate and I may refer here to the following words of Dr. L. Hill [5]: "The air, which is breathed into the lungs, whatever be its content of moisture or temperature, is breathed out approximately at body temperature and saturated with moisture at this temperature. Cold saturated air is excessively dry when warmed up to body temperature and takes up much moisture from the body, warm saturated air (or even half saturated) far less. The breathing of cool air entails, then, much greater evaporation from respiratory membrane and consequent greater flow of lymph through and secretion of fluid from it. The membrane is better washed and kept clean from infecting microbes by such outflow." This latter assumption is contradicted by an eminent physician, the late Abraham Jacobi,[6] who states: "As long as the mucous membranes are in their normal condition the germs can not enter the tissues and the circulation. A catarrh removes this protection; the epithelia are swept away by the fluid. That is the chance for the living enemies."

If we consider, that about every five seconds 500 cc., more or less, of incoming air is trying to replace a similar amount of expired air inside the nasal cavities and the lungs, it seems clear, that such air must be subject to considerable mixing.

A change of vapor pressure of this mixed air must tax the vasomotor apparatus of the mucosa constantly. The export of moisture (Rubner [7]) at a mean temperature and humidity of the room air by the lungs of an adult per hour amounts to 17 gm. when resting, 19 gm. when deep breathing, 34 gm. when singing. Rubner found the evaporation value of the lungs at 77° F. and 6 per cent relative humidity to be 18.4 and at 81 per cent relative humidity to be 10.9 gm. It seems, that we are not materially affected even by a large export of moisture from our lungs, as long as the air is rather dry. It is a different matter when the incoming air contains such a surplus of aqueous vapor, that evaporation by the lungs becomes rather impossible (Hann [8]). Such a condition would seem to call for special aid by the vasomotor nervous system, which acts as a reflex apparatus. "The automatic work of this system, by dilating or contracting vessels under its control, regulates the outflow of heat, of serum, of mucus into the nasal cavities. Generally the moisture inside the nose appears to be insensible, similar to the perspiration insensibilis of the epidermis, but any unusual increase of moisture, brought by the inhaled air, may increase the swelling of the hygroscopic swell bodies of the mucosa to such an extent, that the reflex apparatus by dilating the blood vessels may cause an overflow of the reservoir" (Richter.[9]).

It is to be hoped that some experimental work may overcome the difficulty of determining the vasomotor work of the nasal mucosa under the varying vapor pressure conditions of the incoming and outgoing air. Until then we have to accept the fact that the nasal mucosa, as a hygroscopic substance, will share the hygroscopic nature of other organic substances, like wood for instance. The human vasomotor apparatus of the nose of course varies in its sensitiveness. When unusually sensitive to changes in its area, it may try at once to get rid of an excess of moisture by sneezing, or simply by dilating its blood vessels. Such a vasomotor rhinitis is well known. Acute coryza will depend to a great extent on the sensitiveness of the vasomotor system. Experience teaches that it develops principally at the beginning of or during the passage of a cyclonic weather condition and that it seems to be therefore primarily due to the effect of an excess of moisture in the air.

Any weather condition that is associated with an increase of the aqueous vapor content of the air—and this is typical of the cyclonic weather condition—will necessarily increase the water content of the hygroscopic nasal mucosa and will induce an increased secretion from it. This effect will be minimal and rather insensible in general, but it will favor a more or less increased "running of the nose" in proportion to the degree of sensitiveness of the individual vasomotor apparatus. The functioning of this apparatus, however, depends besides on many factors that influence the general condition of an individual.—*C. M. Richter*.

[1] Weeks, John R.: Note in regard to the primary cause of colds. Mo. WEATHER REV., December, 1920, 48: 690.
[2] Conclusions republished in Mo. WEATHER REV., September, 1920, 48: 507.
[3] Anders, J. M.: Textbook of the practice of medicine, 14th Ed., 1920.
[4] *Journal of Infectious Diseases*, Chicago, February, 1921, 28: No. 2.
[5] Hill, Leonard: Atmospheric environment and health. Mo. WEATHER REV., December, 1920, 48: 687-690.
[6] Jacobi, A.: Colds. *N. Y. Medical Journal*, Mar. 16, 1912.
[7] Rubner: Lehrbuch der Hygiene, 1907.
[8] von Hann, J.: Klimatologie, 1908.
[9] Richter, C. M.: Colds and their relation to the physics of the atmosphere. *Medical Record*, Dec. 6, 1913.